UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,182	08/22/2005	Ryo Kuroda	00684.003650.	5599

5514 7590 11/26/2008

FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER	
HURST, JONATHAN M	

ART UNIT	PAPER NUMBER
4153	

MAIL DATE	DELIVERY MODE
11/26/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/530,182	KURODA ET AL.	
	Examiner	Art Unit	
	JONATHAN M. HURST	4153	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/14/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Challener et al. (US 5,994,150) in further view of Lawrence et al. (US 6,642,881)

Challener et al. discloses a chemical sensor for detecting a reaction of a sensor material with a specimen on the basis of an intensity of a surface plasmon polariton wave propagated along a surface of a sensor medium (See C 1 L 23-37)

comprising the sensor material, (See C 1 L 23-37 where sensor material is monomolecular layer))

said chemical sensor comprising the sensor medium, (See C 1 L 23-37 where sensor medium is thin film of metal)

wherein said sensor medium comprises a periodic structure and the sensor material disposed on the periodic structure, (See Fig 3 and C 6 L 5-42)

Challener et al. does not disclose the periodic structure having a pitch substantially equal to an integral multiple of a wavelength of the surface plasmon polariton wave generated by irradiating an interface between the periodic structure and the sensor material with light.

Lawrence et al. discloses a sensor comprising a sensor material and a periodic structure (See C 1 L 13-27 and Fig. 1) the periodic structure having a pitch substantially equal to an integral multiple of a wavelength of the surface plasmon polariton wave generated by irradiating an interface between the periodic structure and the sensor material with light. (See C 1 L 13-27 and C 4 L 46-55 where pitch is a multiple of wavelength)

Lawrence et al. and Challener et al. are analogous because both references teach the use of sensors comprised of periodic structures and the use of induced surface plasmon poloritons.

It would have been obvious to one of ordinary skill in the art to use the periodic structure of Lawrence in the sensor of Challener because the periodic structure of Lawrence fulfills the need for a surface profile of a sensor as described in Challener and provides a substantially similar and functional example of said surface profile. (See Challener C 6 L 4-15) Furthermore it is known in the art to alter the pitch and shape of the periodic structures of devices such as those described by Challener and Lawrence depending upon application (See Lawrence C 4 L 46-55 and Challener C 6 L 4-15) and as such one of ordinary skill in the art would reasonably be able to alter said periodic structures through routine experimentation and arrive at a configuration with a pitch having a substantially equal to an integral multiple of the wavelength of a surface plasmon polariton wave.

Regarding claim 2 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the sensor material is a biochemical sensor material (See Challener C 1 L 23-37)

4. Claims 3-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Challener et al. (US 5,994,150) in view of Lawrence et al. (US 6,642,881) as applied to claims 1-2 above, and further in view of Bozhevolnyi et al. (US 2002/0021445).

Regarding claim 3 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the periodic structure comprises a plurality of indentations provided in a metal film with a predetermined pitch (See Challener Fig. 3 and Fig. 4) the indentations having a size smaller than a wavelength of the irradiation light. (See Lawrence C 4 L46-55 where pitch is 0.5 times the wavelength of the light the indentations are inherently smaller than 0.5 times the wavelength) but does not specifically disclose the sensor wherein the periodic structure comprises a plurality of openings provided in a metal film with a predetermined pitch the openings having a size smaller than a wavelength of the irradiation light.

Bozhevolyni et al. discloses the device wherein where a periodic structure comprises a plurality of openings provided in a metal film with a predetermined pitch. (See [0129] and Fig. 2C where openings or holes 26 are provided in a metal film)

Bozhevolyni et al. and modified Challener are analogous because both references teach devices comprised of periodic structures and the use of induced surface plasmon poloritons.

It would have been obvious to one of ordinary skill in the art at the time of invention to replace the plurality of indentations provided in a metal film with a predetermined pitch in the sensor of modified Challener with the plurality of openings

provided in a metal film with a predetermined pitch of Bozhevolyni et al. because a predetermined pitch pattern in a metal layer can be written as either openings or indentations (See Bozhevolyni [0129] where holes are openings) and the openings represent a functional example of a surface profile as described by Challener. (See C 6 L 8-13)

Regarding claim 4 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the openings have a substantially circular shape or a substantially polygonal shape (See Challener Fig. 4 where opening is polygonal and C 6 L 5-13), and their periodic arrangement is a two-dimensional arrangement in the metal film surface. (See Bozhevolyni [0129] where scattering centers are arranged in a 2D pattern)

Regarding claim 5 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the openings have a slit shape, and their periodic arrangement is a one-dimensional arrangement in the metal film surface. (See Lawrence Fig. 1 where figure shows troughs or opening slits and peaks are formed in a metal film in a sinusoidal pattern)

Regarding claim 6 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the openings include adjacent two openings sandwiching a metal film portion having a length of circumference which is a

substantially integral multiple of a wavelength of the surface plasmon polariton wave. (See Lawrence Fig. 1 and Challener Fig. 4 where two troughs or opening slots sandwich peaks and Lawrence C 4 L 46-55 where amplitude and pitch of grating is a multiple of wavelength and Challener C 6 L 9-11 where grating is square) Furthermore it is known in the art to alter the pitch and shape of the periodic structures of devices such as those described by modified Challener depending upon application (See Lawrence C 4 L 46-55 and Challener C 6 L 4-15) and as such one of ordinary skill in the art would reasonably be able to alter said periodic structures through routine experimentation and arrive at a configuration with a length of circumference substantially equal to an integral multiple of the wavelength of a surface plasmon polariton wave.

Regarding claim 7 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the periodic structure is provided in a plurality of periodic structures which have the same or different sizes and/or pitches of their openings and the same or different arrangement directions. (See Challener Fig. 6, Fig. 8, C 9 L 28-52, and C 11 L 1-5)

Regarding claim 8 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the periodic structure comprises at least one opening provided in a metal film with a predetermined pitch (See Bozhevolyni Fig. 2C where two openings sandwich peaks in the metal film) and at least one recess portion or projection portion provided in the metal film (See Lawrence C 1 L28-36 where

radiation is re-emitted or projected at edge or curve in metal film grating), the opening having a size which is smaller than a wavelength of the irradiation light. (Lawrence C 4 L46-55 where pitch is 0.5 times the wavelength of the light the openings are inherently smaller than 0.5 times the wavelength)

Regarding claim 9 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the opening and the recess portion or the projection portion have a substantially circular shape or a substantially polygonal shape (See Challener Fig. 4 where opening is polygonal and C 6 L 5-13), and their periodic arrangements are a two- dimensional arrangement. (See Bozhevolyni [0129] where scattering centers are arranged in a 2D pattern)

Regarding claim 10 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the two- dimensional arrangement is such an arrangement that the recess portion or the projection portion is disposed concentrically around the opening. (See Challener C 9 L 37-52 where grooves containing a projection portion and opening are formed concentrically)

Regarding claim 11 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the opening and the recess portion or the projection portion have a slit shape, and their periodic arrangements are a one-

dimensional arrangement. (See Lawrence Fig. 1 where figure shows troughs or opening slits and peaks are formed in a metal film in a sinusoidal pattern)

Regarding claim 12 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the opening includes adjacent two openings sandwiching a metal film portion having a length of circumference which is a substantially integral multiple of the wavelength of the surface plasmon polariton wave. (See Lawrence Fig. 1 and Challener Fig. 4 where two indentations or openings sandwich peaks and Lawrence C 4 L 46-55 where amplitude and pitch of grating is a multiple of wavelength and Challener C 6 L 9-11 where grating is square and as such circumference is a multiple of wavelength) Furthermore it is known in the art to alter the pitch and shape of the periodic structures of devices such as those described by modified Challener depending upon application (See Lawrence C 4 L 46-55 and Challener C 6 L 4-15) and as such one of ordinary skill in the art would reasonably be able to alter said periodic structures through routine experimentation and arrive at a configuration with a length of circumference substantially equal to an integral multiple of the wavelength of a surface plasmon polariton wave.

Regarding claim 13 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the metal film is a film of a metal or alloy selected from the group consisting of gold, silver, copper, and aluminum. (See Challener C 6 L 14-17)

Regarding claim 14 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the periodic structure comprises fine metal

particles disposed on a substrate (See Bozhevolyni Fig. 2C and [0129] where metal particles are disposed between holes) with a predetermined pitch, the fine metal particles having a size which is smaller than the wavelength of the surface plasmon polariton wave. (See Lawrence C 4 L 46-55)

Regarding claim 15 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the fine metal particles have a length of circumference which is a substantially integral multiple of the wavelength of the surface plasmon polariton wave. (See Lawrence C 4 L 46-55 amplitude and pitch of grating is a multiple of wavelength and Challener C 6 L 9-11 where grating is square and as such circumference would be a multiple of wavelength) Furthermore it is known in the art to alter the pitch and shape of the periodic structures of devices such as those described by modified Challener depending upon application (See Lawrence C 4 L 46-55 and Challener C 6 L 4-15) and as such one of ordinary skill in the art would reasonably be able to alter said periodic structures through routine experimentation and arrive at a configuration with a length of circumference substantially equal to an integral multiple of the wavelength of a surface plasmon polariton wave.

Regarding claim 16 modified Challener discloses all the claim limitations as set forth above as well as the sensor wherein the sensor medium comprises the periodic structure and a substrate for the sensor material disposed on the periodic structure, the

substrate comprising a prism.(See Bozhevolyni Fig. 1A , [0005], and Challener C 1 L 37-40)

Regarding claim 17 modified Challener discloses a sensor apparatus (See Challener Fig. 2 and C 5 L 64-66), comprising: a chemical sensor (See Challener 250 Fig. 2 and C 5 L 64-66), a light source for irradiating the chemical sensor with light (See Challener 220 Fig. 2 and C 5 L 64-66), and a photodetector for detecting light transmitted through or reflected from the chemical sensor. (See Challener 260 and 265 Fig. 2 and C 5 L 64-66)

Regarding claim 18 modified Challener discloses all the claim limitations as set forth above as well as the apparatus, wherein the photodetector comprises a spectroscope. (See Challener C 11 L 14-21)

5. Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Challener et al. (US 5,994,150) in view of Lawrence et al. (US 6,642,881) further in view of Bozhevolnyi et al. (US 2002/0021445) as applied to claims 3-18 above, and further in view of Corn et al. (US 2003/0100127).

Regarding claim 19 modified Challener discloses all the claim limitations as set forth above but does not disclose the sensor wherein the photodetector comprises means for detecting light transmitted through a band-pass filter.

Corn et al. discloses a sensor wherein the photodetector comprises means for detecting light transmitted through a band-pass filter. (See Abstract and [0127])

Corn et al. and modified Challener are analogous because both references teach sensors comprised of periodic structures and the use of induced surface plasmon poloritons.

It would have been obvious to one of ordinary skill in the art at the time of invention to use a detector with means for detecting light transmitted through a band-pass filter in the sensor of modified Challener because the detector allows the sensor to optically measure the results of changes in the sensor material on the metal surface of a SPR sensor (See Corn Abstract and [0127]) as required by the sensor of modified Challener. (See Challener C 1 L 23-37)

Regarding claim 20 modified Challener discloses all the claim limitations as set forth above as well as the apparatus wherein the sensor medium is integrally supported in a micro total analysis system prepared through a semiconductor process. (See Corn [005], Bozhevolnyi [0123], and Challener C 11 L 30-40 where device is used in sensor applications and can be used in micro total analysis systems such as protein and gene chips and can also be used to monitor multiple substances)

Regarding claim 21 modified Challener discloses all the claim limitations as set forth above as well as the apparatus wherein the sensor medium is integrally supported in a DNA chip prepared through a semiconductor process. (See Corn [005] and Bozhevolnyi [0123] where gene chip is a dna chip and device is used in sensor applications)

Regarding claim 22 modified Challener discloses all the claim limitations as set forth above as well as the apparatus, wherein wherein the sensor medium is integrally supported in a protein chip prepared through a semiconductor process. (See Corn [005] and Bozhevolnyi [0123] where device is used in sensor applications)

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kock et al. (US 5,568,504) discloses a device utilizing surface plasmon polariton waves generated on a metal film.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN M. HURST whose telephone number is

(571)270-7065. The examiner can normally be reached on Mon. - Thurs. 6:30-5:00; Every Fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571)272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/

Primary Examiner, Art Unit 1797

/J. M. H./

Examiner, Art Unit 4153